

REMARKS

Claims 1-40 are pending in this application. By this Amendment, claims 1, 20 and 35 have been amended.

The Office Action objects to claims 11, 17-19 and 31 as being dependent upon a rejected base claim, but would be allowable is rewritten in independent form.

The Office Action rejects claims 1-3, 5, 16, 20-25, 27, 33 and 38-40 under 35 U.S.C. 102(e) as being allegedly anticipated by U.S. Publication No. 2003/0045303 (Oda).

Counsel has carefully reviewed the Oda reference. Oda discloses that a mobile station device receives a GPS signal transmitted by one or more satellites and a set of PN codes and apparent signal delay of neighboring base stations. In addition, Oda discloses that one of the neighboring base stations is selected as a “reference base station” based on the minimum apparent signal delay (usually the closest to the mobile station). A positioning server uses this information to calculate the positions of the base stations and the distance between the mobile station and the base stations using the apparent signal delays of the base station. Oda states that the positioning server “calculates distance between the mobile station MS and each base station BS from the apparent signal delays of the other base stations BS against the reference base station BS being a time basis”. Oda, paragraph 17.

Claims 1, 20, 21, 22, 38 and 39

Oda does not teach or suggest the concept of receiving a wireless radio signal at several locations, generating receive signal sample data representing the received signal at each location, and using the receive signal sample data at one of the locations as a reference waveform against which a correlation is made to determine the time of arrival of the wireless radio signal at each of the locations. Thus, unlike Oda, the subject matter of independent claims 1, 30, 38 and 39 pertains to using the receive signal sample data at one location as a reference waveform in order to compute the time of arrival of the signal at the other locations. Oda only vaguely suggests designating a base station as a reference base station based on the smallest apparent signal delay with respect to the mobile station. Language for this concept is contained in each of the independent claims.

Claims 2 and 23

Oda does not teach or suggest in the noted paragraph 17 generating one or more of bandwidth, duration, center frequency and signal strength associated with reception of the wireless radio signal at each known location. Oda merely describes selecting the base station that has the minimum apparent signal delay.

Claims 3 and 24

Oda does not teach or suggestion comparing the data (described in claim 2) associated with reception of the wireless radio signal at each known location to determine the known location that best receives the wireless radio signal. Again, Oda merely describes selecting the base station with the minimum apparent signal delay.

Claims 5 and 25

Oda does not teach selecting as the reference waveform the receive signal sample data for the location that has the strongest receive signal strength. See comments above with respect to claim 3. Selecting the base station having the minimum signal delay (as Oda describes) is not the same as selecting receive signal sample data for the known location having the strongest receive signal strength.

Claim 16

The noted paragraph 18 of Oda does not describe producing first and second candidate locations and selecting one of the candidate locations as the actual location of a target device. Oda describes making a declaration when the position of a mobile device is not possible.

Claims 27 and 33

Oda does not describe that one of the radio devices at the known locations, e.g., the first radio device, transmits the reference signal with respect to which a time difference of arrival is computed.

Claim 35

Paragraph 21 of Oda does not describe that each of the radio devices at a known location has a buffer memory that stores receive signal sample data associated with reception of the reference signal and associated with reception of the wireless radio signal from which time different of arrival of those signals is determined. Oda only describes

storing the PN code having the minimum apparent signal delay and the apparent signal delays of the reference base station and other neighboring base stations.

For the foregoing reasons, it is respectfully requested that the rejection of claims 1-3, 5, 16, 20-25, 27, 33 and 38-40 over Oda be withdrawn.

The Office Action rejects claims 4, 6-10, 12-15, 26, 28-30, 32, 34, 36 and 27 under 35 U.S.C. 103(a) as being allegedly unpatentable over Oda in view of U.S. Patent No. 6,246,884 (Karmi).

Claims 4-7 and 26

Karmi discloses distributing signal features of a signal for a mobile device to be located, to a plurality of base stations. The base stations reconstruct a replica of the signal from the signal features for purposes of correlating the replica to a signal received from the mobile device at the base stations. By contrast, the subject matter of these claims pertains to sending the actual receive signal sample data from one known location to each of the other known locations for time of arrival determination at each of the other known locations, which is not the same as signal features from which a replica is constructed.

Claims 8-10 and 27-32

The concept of transmitting the reference signal prior to or after a transmission of a wireless radio signal from the target device is not simply a matter of how often one would like to transmit signal. These claims describe a technique useful to ensure that the reference signal and the target device signal occur relatively close in time to each other to facilitate a time difference of arrival measurement. Otherwise, the signal occurrences may happen too far apart in time from each other such that their reception at the known locations will be missed or determined to be irrelevant. Furthermore, the Office Action cites no reference that teaches these claimed concepts.

Claims 13, 14 and 34

The noted sections of Karmi do not describe transmitting from a first known location to each of the other known locations data describing the time delay at the first location between reception of the wireless radio signal (from the target device) and transmission of the reference signal. Karmi merely describes transmitting signal features

to the base stations to enable each base station to produce a replica signal of the mobile device to be located.


Claim 15

The Office Action does not cite any reference that teaches the concept of transmitting the reference signal multiple times from multiple antennas of a device, each time using different transmit antenna weights. The purpose of this technique is to increase the likelihood that the reference signal will be received at each of the known locations where the time difference of arrival measurements are to be made.

An Information Disclosure Statement is submitted herewith citing reference from a search report in the counterpart PCT application.

Based on the foregoing, it is respectfully submitted that the rejection of the claims should be withdrawn and the claims allowed. The Examiner is invited to telephone the undersigned if the Examiner has any questions or comments.

Respectfully submitted,


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